

SUPPORT FOR THE AMENDMENTS

Claims 1, 3, 4 and 6-15 are amended to eliminate multiple dependencies and use wording and structure consistent with U. S. patent law practice.

Claim 1 is supported by original Claims 1 and 5.

Claim 5 is canceled.

Support for the amendment to Claim 8 is found beginning on page 19, line 23, and bridging to page 20.

No new matter will be added to this application by entry of this amendment.

Upon entry of this amendment, Claims 1-4 and 6-15 are active.

REMARKS/ARGUMENTS

The claimed invention is directed to a method to produce a hydrocarbon-containing gas of low sulfur compound content and production of a low sulfur content hydrogen as a fuel for a fuel cell. Sulfur compounds are poisons for electrode catalysts and therefore fuel cells require hydrogen gas having a low sulfur compound for efficient and prolonged performance. Methods to produce hydrogen gas of low sulfur compound content for fuel cells are sought.

The claimed invention addresses this problem by providing a method for removing sulfur compounds contained in a hydrocarbon-containing gas comprising feeding a hydrocarbon-containing gas to a desulfurizing bed to remove sulfur compounds contained in the hydrocarbon-containing gas, wherein the desulfurizing bed comprises: a desulfurizing agent A comprising zeolite and at least one metal component selected from the group consisting of Ag, Cu, Ni, Zn, Mn, Fe, Co, an alkaline metal, an alkaline earth metal and a rare earth metal; and a desulfurizing agent B comprising at least one selected from the group consisting of a metal element, a metal oxide and a metal component-carried oxide. No such method is disclosed or suggested in the cited references.

Applicants respectfully note that Claim 1 is herein amended to include the description of desulfurizing agent A as:

“a desulfurizing agent A comprising zeolite and at least one metal component selected from the group consisting of Ag, Cu, Ni, Zn, Mn, Fe, Co, an alkaline metal, an alkaline earth metal and a rare earth metal . . .”

The rejection of Claims 1-3 and 6-15 under 35 U.S.C. 102(b) over Takashi et al. (JP 2001-278602) is respectfully traversed.

Takashi neither discloses nor suggests the method of desulphurization of hydrocarbon-containing gas as presently described in Claim 1 of the claimed invention.

Takashi is directed to a method for removing sulfur from petroleum hydrocarbons involving contacting the petroleum hydrocarbon with a first desulphurization agent which is a **halogen supported on a porous substrate** [0005] and [0007] (17th group element, preferably Bromine) and a second desulphurization agent such as Co-Mo/alumina and Ni-Mo/alumina [0010].

Nowhere does this reference disclose or suggest a desulfurizing agent comprising zeolite and at least one metal component selected from the group consisting of Ag, Cu, Ni, Zn, Mn, Fe, Co, an alkaline metal, an alkaline earth metal and a rare earth metal.

Applicants respectfully submit that a proper finding of anticipation requires that “[e]very element of the claimed invention . . . be literally present, arranged as in the claim. *Perkin-Elmer Corp.*, 732 F.2d at 894, 221 USPQ at 673; *Kalman v. Kimberly-Clark Corp.*, 713 F.2d 760, 771-72, 218 USPQ 781, 789 (Fed. Cir. 1983), *cert. denied*, 465 U.S. 1026 [224 USPQ 520] (1984). The identical invention must be described in as complete detail in the reference as is described in the claimed invention.

Regarding Claim 8 and subsequent dependent claims, Takashi is silent with respect to Carbonyl sulfide. Applicants have stated in the specification, the problems associated with conventional methods of removal of this material and therefore, Takashi does not disclose or suggest such a hydrocarbon-containing gas for a fuel cell.

In view of the foregoing, Applicants respectfully submit that Takashi can neither anticipate nor render obvious the presently claimed invention and therefore, withdrawal of the rejection of Claims 1-3 and 6-15 under 35 U.S.C. 102(b) over Takashi et al. (JP 2001-278602) is respectfully requested.

The rejection of Claims 4 and 5 under 35 U.S.C. 103(a) over Takashi in view of Satokawa et al. (US 2001/0014304) is respectfully traversed.

Satokawa is cited to show metals, alkali metals, alkaline earth metals and rare earth metals with zeolite and zeolite of beta and faujasite forms. Satokawa is directed to an adsorbent for removing sulfur compounds from fuel gases containing sulfur compounds, which comprises one or more transition metals ion-exchanged onto a zeolite resin and a method for removing sulfur compounds by passing the fuel-gas through the adsorbent.

Neither Takashi nor Satokawa discloses or suggests the significant improvement in performance achieved according to the method of the claimed invention and demonstrated in Table 1 of the specification. Table 1 is reproduced below for the Examiner's convenience.

Table 1

	Effluent time (h) exceeding 0.07 weight ppm (0.1 vol ppm)			
	COS	DMS	TBM	DMDS
Example 1	6	11	>15	15
Example 2	2	6	14	10
Example 3	3	7	>15	15
Example 4	4	9	>15	11
Example 5	5	10	>15	15
Example 6	5	9	>15	15
Example 7	7	11	>15	15
Example 8	6	11	>15	15
Example 9	7	11	>15	15
Example 10	7	11	>15	15
Example 11	7	11	>15	15
Example 12	3	6	>15	10
Example 13	5	8	>15	14
Comparative Example 1	0	11	>15	9
Comparative Example 2	1	0	>15	3

In Table 1, the values indicate the number of hours a catalyst is active in the removal of Carbonyl Sulfide (COS), dimethyl sulfide (DMS), t-butylmercaptan (TBM) and dimethyl disulfide (DMDS). Examples 1-13 represent the method according to the claimed invention, while Comparative examples 1 and 2, only one of desulphurizing agent A or B was employed. The data indicates that with respect to COS, the results obtained according to the invention, where the two agents are combined, are significantly improved over what would be expected from the results obtained from the individual agents. Thus from 2 to 7 hours of effective catalyst removal of COS is obtained according to the method of the invention in comparison to only one hour expected (1+0) from the comparative examples.

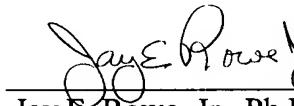
Applicants respectfully submit that neither Takashi nor Satokawa suggest or provide any motivation to expect such improvement and therefore, this combination of references cannot render the claimed invention obvious. Withdrawal of the rejection of Claims 4 and 5 under 35 U.S.C. 103(a) over Takashi in view of Satokawa et al. is respectfully requested.

Applicants respectfully submit that the Abstract of the Disclosure is herein amended to be consistent with U.S. patent law practice.

Applicants respectfully submit that the above-identified application is now in condition for allowance and early notice of such action is earnestly solicited.

Respectfully submitted,

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